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ABSTRACT

The United States Training and Employment Service General Aptitude Test Battery (GATB), first published in 1947, has been included in a continuing program of research to validate the tests against success in many different occupations. The GATB consists of 12 tests which measure nine aptitudes: General Learning Ability; Verbal Aptitudes; Numerical Aptitude; Spatial Aptitude; Form Perception; Clerical Perception; Motor Coordination; Finger Dexterity; and Manual Dexterity. The aptitude scores are standard scores with 100 as the average for the general working population, and a standard deviation of 20. Occupational norms are established in terms of minimum qualifying scores for each of the significant aptitude measures which, when combined, predict job performance. Cutting scores are set only for those aptitudes which aid in predicting the performance of the job duties of the experimental sample. The GATB norms described are appropriate only for jobs with content similar to that shown in the job description presented in this report. A description of the validation sample is also included. (AG)

ED 063417

TECHNICAL REPORT

ON

STANDARDIZATION OF THE GENERAL APTITUDE TEST BATTERY

FOR

MACHINE ATTENDANT (hardware) ~~6-88.644~~ 619.885

~~B-510~~
S-233

TM 001 244

U. S. Employment Service in
Cooperation with
California State Employment Service

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GATB #2377

STANDARDIZATION OF THE GENERAL APTITUDE TEST BATTERY

FOR

MACHINE ATTENDANT (hardware) 6-88.644

B-510

Summary

The General Aptitude Test Battery, B-1002A, was administered during the period of October 3, 1960 to April 19, 1961 to a final sample of 50 Machine Attendants 6-88.644 employed by the Tubing Seal Cap Company, San Gabriel, California, for the purpose of developing occupational norms. The criterion consisted of combined supervisory ratings based on a descriptive rating scale. On the basis of mean scores, standard deviations, correlations with the criterion, job analysis data, and their combined selective efficiency, Aptitudes K-Motor Coordination, F-Finger Dexterity, and M-Manual Dexterity were selected for inclusion in the final test norms.

GATB Norms for Machine Attendant 6-88.644, B-510

B-1001			B-1002		
Aptitude	Tests	Minimum Acceptable Aptitude Score	Aptitude	Tests	Minimum Acceptable Aptitude Score
T	CB-1-G CB-1-K	85	K	Part 8	90
F	CB-1-O CB-1-P	90	F	Part 11 Part 12	85
M	CB-1-M CB-1-N	100	M	Part 9 Part 10	95

Effectiveness of Norms

The data in Table IV indicate that 12 of the 16 poor workers, or 75 percent of them, did not achieve the minimum scores established as cutting scores on the recommended test norms. This shows that 75 percent of the poor workers would not have been hired if the recommended test norms had been used in the selection process. Moreover, 26 of the 30 workers who made qualifying test scores, or 87 percent, were good workers.

I. Purpose

This study was conducted to determine the best combination of aptitudes and minimum scores to be used as norms on the General Aptitude Test Battery for the occupation of Machine Attendant 6-88.644.

II. Sample

The General Aptitude Test Battery, B-1002A, was administered during the period of October 3, 1960 through April 19, 1961 to a sample of 15 male and 42 female Machine Attendants 6-88.644. The delay in the testing program was due to a plant layoff which required testing employees after they were recalled to work. Seven workers were eliminated from the sample. One male and three females because of a language barrier, one male because of inability to understand test instructions, and two females because of finger amputations. Therefore, the final sample consisted of 13 male and 37 female for a total of 50 Machine Attendants 6-88.644.

The Company utilizes all available sources of recruitment to hire trainees for work classified as machine attendants. Job applicants are required to complete a work application form and have on oral interview conducted by the Personnel Assistant and a second interview with the foreman of the shift concerned. There are no fixed age or educational requirements.

The ability to speak, read, and write English is preferable but not mandatory. Trainees are screened on their interests and previous work experiences which required considerable use of hands and fingers. The Company has not utilized tests in the hiring process. There are no formal training programs. On-the-job training is utilized with the trainee being assigned as a helper. There is no specified training time or established rate of progress. The average length of time in training is three months after which time the trainee is able to work independently without close supervision. All of the workers in the sample are considered experienced workers.

TABLE I

Means (M), Standard Deviations (σ), Ranges, and Pearson Product-Moment Correlations with the Criterion (r) for Age, Education, and Experience

N = 50	M	σ	Range	r
Age (years)	35.5	11.3	20-60	.129
Education (years)	9.5	2.1	6-13	.046
Experience (months)	39.7	28.0	3-118	.350*

*Significant at the .05 level

The significant correlation in Table I indicates that either (1) more experienced workers performed better on the job, or (2) raters were biased in giving higher ratings to these workers.

III. Job Description

Job Title: Machine Attendant (hardware) 6-88.644

Job Summary: Performs various tasks on a rotational basis to produce doorknobs from aluminum, brass, or bronze ribbon stock.

Operates automatic cupping machine to form doorknobs cups from flat metal coiled stocks: Visually checks doorknob cups for imperfections as cups start down conveyor. Picks up and discards cups having imperfections. Using emery cloth, buffs cups having superficial scratches and replaces cups on conveyor, Inserts eight-time fork into cups after a supply of cups comes to rest at end of conveyor; lifts and inspects cups for imperfections; places cups in carton. Maintains pace with cupping machine in inspecting, forking and packing.

Picks doorknob cups out of wirebasket, visually inspects cups for imperfections, and positions cups onto line of round receptacles or onto line of vertical pins of continuous chain conveyor entering annealing machine; picks up doorknob cups from conveyor emerging from annealing machine, inspects cups for imperfections, and packs cups into cartons.

Operates forming press to perform first step shaping of doorknobs from doorknob cups: Positions cup, base down, in front die of circular bed, steps on treadle switch and positions one cup in each successive die as they revolve around to the front of the work station.

Operates metal trimming machine to cut doorknob shanks to specified length: Picks up doorknob from conveyor emerging from forming press and turns knob in hand to hold shanks in alignment with horizontal, rotating spindle, and slides knob into spindle; steps on treadle to raise circular trim blade and cut shank to specified length.

Operates expanding press to perform second step in shaping of doorknobs: Depresses machine treadle placing machine in operation, picks up doorknobs from conveyor, visually inspects knobs for imperfections, and positions knobs face down in carton on slanting metal holding rack.

Operates punch press to pierce hole in base of doorknobs: Positions knob, shank down, on jig located on press bed and depresses both left and right machine actuating levers simultaneously with both hands to cause die to descend and pierce hole through base of knob.

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IV. Experimental Battery

All the tests of the GATB, B-1002A, were administered to the sample group.

V. Criterion

The criterion consisted of supervisory ratings made on an adaption of the Descriptive Rating Scale developed by the United States Employment Service, Form SP-21, with a time interval of two weeks between the first and second rating. The criterion data were collected during the period August 22, 1961 to September 13, 1961. The rating scale consisted of seven items with five alternatives for each item. The alternatives indicated the degree of job performance attained. Weights of one through five were assigned to each alternative so that the minimum possible score was seven and the maximum thirty-five. The coefficient of reliability between the two ratings was .926 indicating a high significant relationship. The final criterion consisted of the combined scores of the two ratings. The distribution of the combined scores ranged from 34-70, with a mean score of 51.64 and a standard deviation of 9.879.

VI. Qualitative and Quantitative Analyses

A. Qualitative Analysis:

The job analysis indicated that the following aptitudes measured by the GATB appear to be important for this occupation:

Form Perception (P) - required for visual inspection of doorknob cups and formed doorknobs to detect and reject those cups and knobs having scratches, dents and imperfections.

Motor Coordination (K) - required to coordinate movements and keep pace with conveyors and machine in forking up cups with fork tines; positioning or removing cups from receptacles; positioning knobs on dies of revolving bed of forming press.

Finger Dexterity (F) and Manual Dexterity (M) - required in manipulating cups, including removing, positioning, transferring and holding cups on conveyors and forming press dies; and in activating levers of punch press.

On the basis of the job analysis data, V-Verbal Aptitude and N-Numerical Aptitude were rated "irrelevant" for successfully performing the duties of this job.

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B. Quantitative Analysis:

TABLE II

Means (M), Standard Deviations (σ), and Pearson Product-Moment Correlations with the Criterion (r) for the Aptitudes of the GATB; N = 50

Aptitudes	M	σ	r
G-Intelligence	81.9	13.0	-.070
V-Verbal Aptitude	85.6	13.2	-.074
N-Numerical Aptitude	79.3	16.0	-.220
S-Spatial Aptitude	85.5	16.6	-.028
P-Form Perception	84.3	16.8	-.084
Q-Clerical Perception	86.9	13.2	-.152
K-Motor Coordination	97.0	14.3	.181
F-Finger Dexterity	103.0	15.9	.433**
M-Manual Dexterity	108.0	16.4	.269

**Significant at the .01 level

C. Selection of Test Norms:

TABLE III

Summary of Qualitative and Quantitative Data

Type of Evidence	Aptitudes								
	G	V	N	S	P	Q	K	F	M
Job Analysis Data									
Important					X		X	X	X
Irrelevant		X	X						
Relatively High Mean							X	X	X
Relatively Low Sigma	X	X				X	X		
Significant Correlation with Criterion								X	
Aptitudes to be Considered for Trial Norms							K	F	M

Trial norms consisting of various combinations of Aptitudes K, F and M with appropriate cutting scores were evaluated against the criterion by means of the Phi Coefficient technique. A comparison of the results showed that B-1002 norms consisting of K-90, F-85 and M-95 had the best selective efficiency.

VII. Validity of Norms (Concurrent)

The validity of the norms was determined by computing a Phi Coefficient between the test norms and the criterion and applying the Chi Square test. The criterion was dichotomized by placing 32 percent of the sample in the low criterion group because this percent was considered to be the unsatisfactory or marginal workers.

Table IV shows the relationship between test norms consisting of Aptitudes K, F and M with critical scores of 90, 85 and 95, respectively, and the dichotomized criterion for Machine Attendant 6-88.644. Workers in the high criterion group have been designated as "good workers" and those in the low criterion group as "poor workers."

TABLE IV

Validity of Test Norms for Machine Attendant 6-88.644
(K-90, F-85, M-95)

N = 50	Non-Qualifying Test Scores	Qualifying Test Scores	Total
Good Workers	8	26	34
Poor Workers	12	4	16
Total	20	30	50

Phi Coefficient = .49
χ^2 = 12.005
P/2 < .0005

The data in the above table indicate a significant relationship between the test norms and the criterion for the sample.

VIII. Conclusions

On the basis of the results of this study, Aptitudes K, F and M with minimum scores of 90, 85 and 95, respectively, have been established as B-1002 norms for Machine Attendant 6-88.644 The equivalent B-1001 norms consist of T-85, F-90 and M-100.

IX. Determination of Occupational Aptitude Pattern

Of the existing of 35 OAP's (revised 10/61), a significant relationship between OAP-34 and the criterion for the experimental sample was obtained. The proportion of the sample screened out by OAP-34 was .36, which is within the required range of .10 to .60. Therefore, the occupation Machine Attendant 6-88.644 will be incorporated into OAP-34.